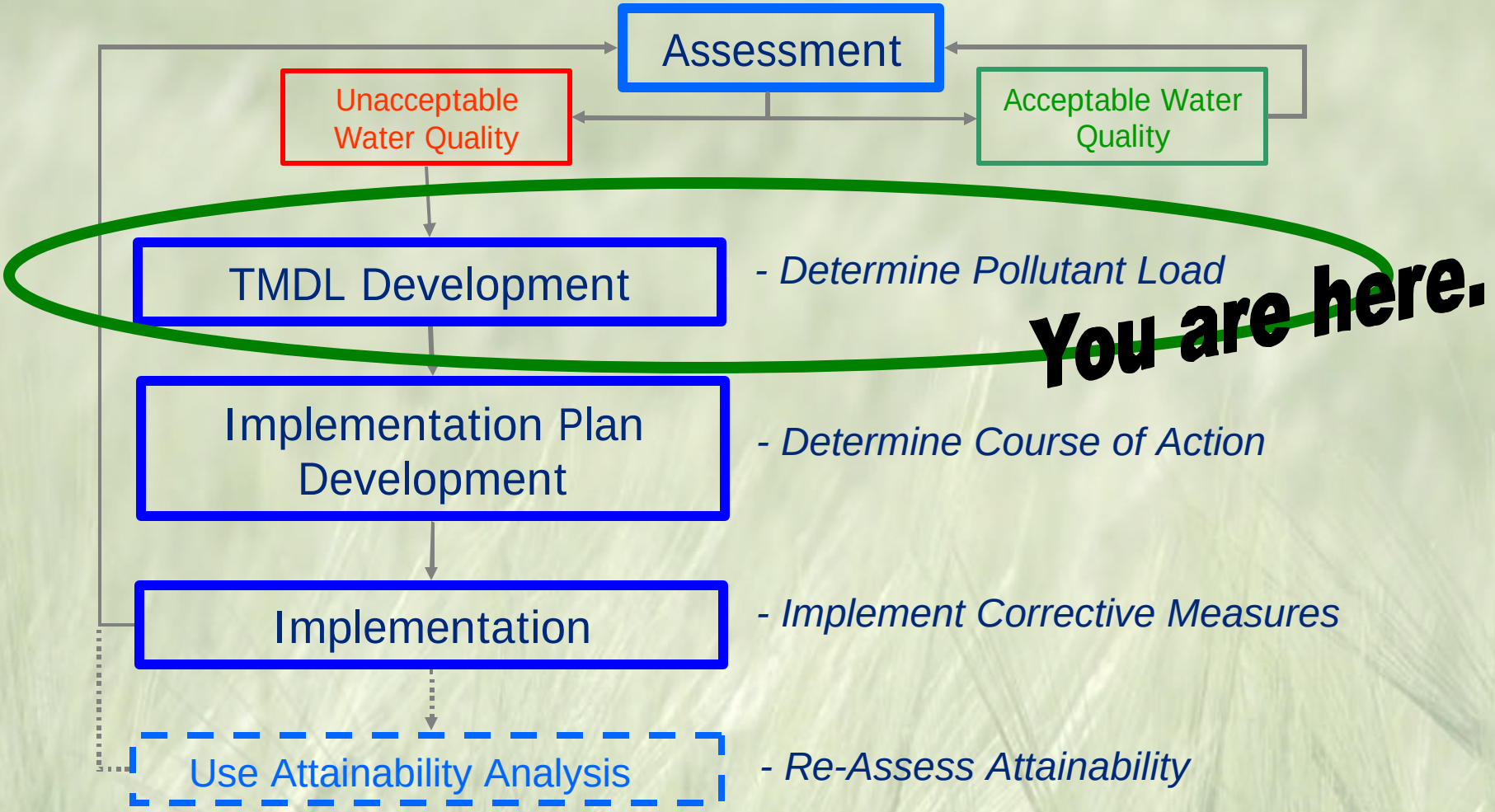
E. coli Bacterial TMDL Development and Source Assessment for

Hatcher Run and UT Nebletts Mill Run

First Public Meeting

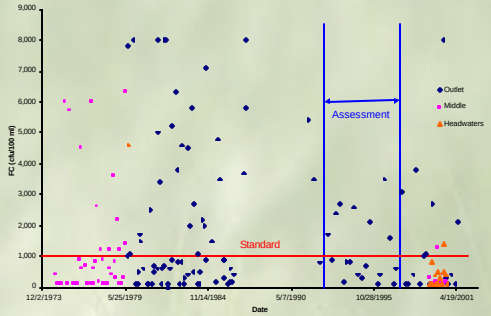
May 5, 2010

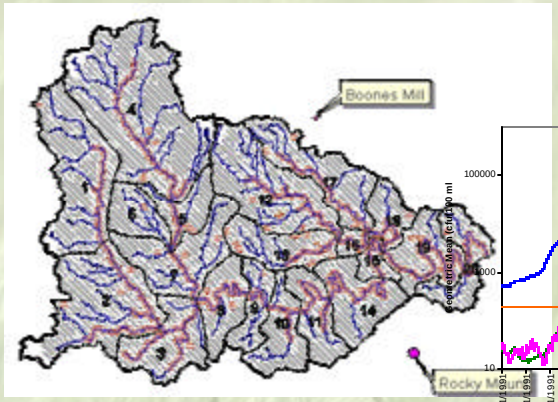
TMDL Process

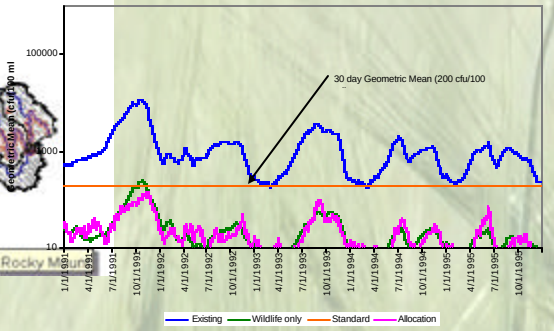


Major Components of the TMDL Report Development

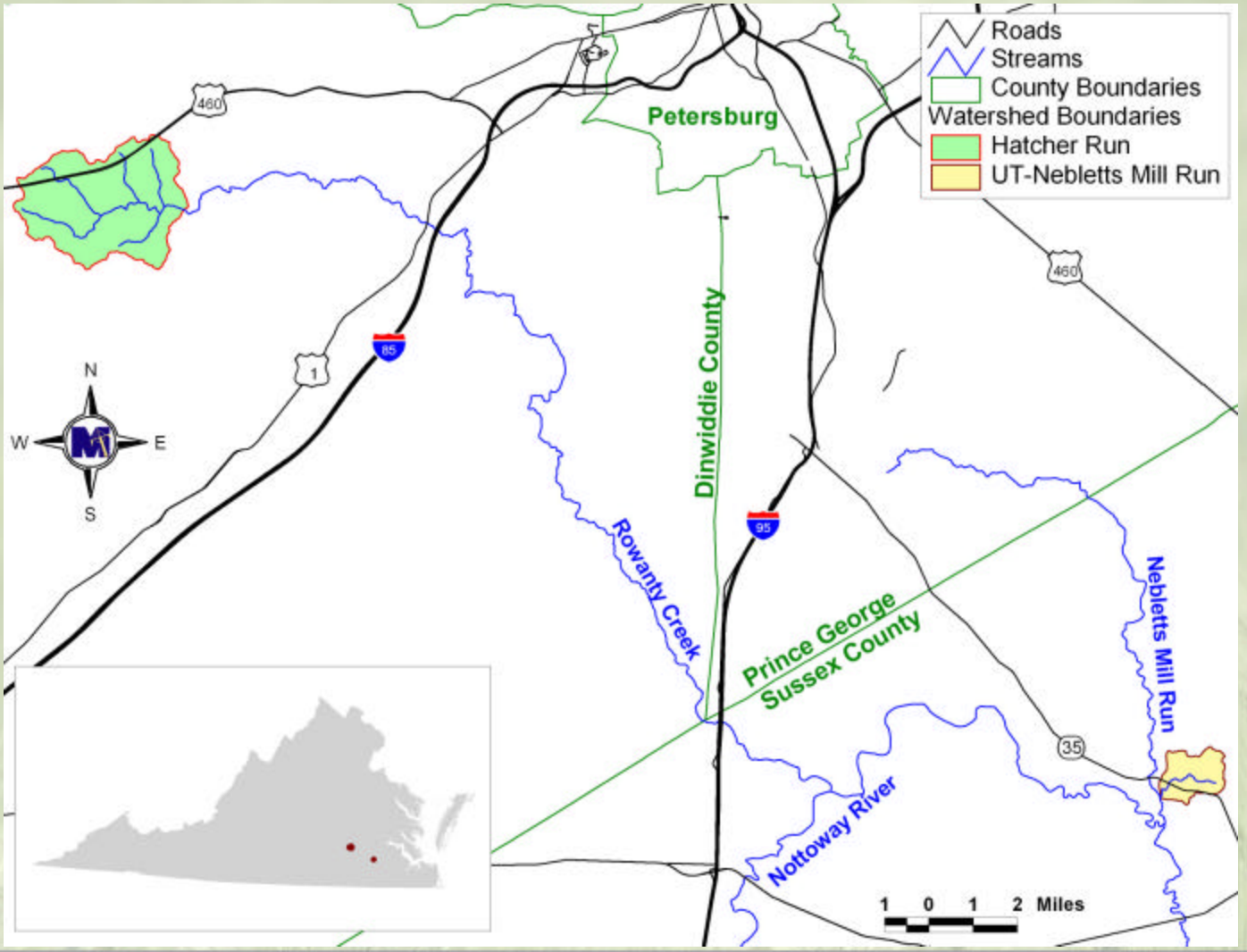
- Source Assessment
- Modeling
  - Hydrology
  - Water Quality
  - Load Allocation
- Public Participation



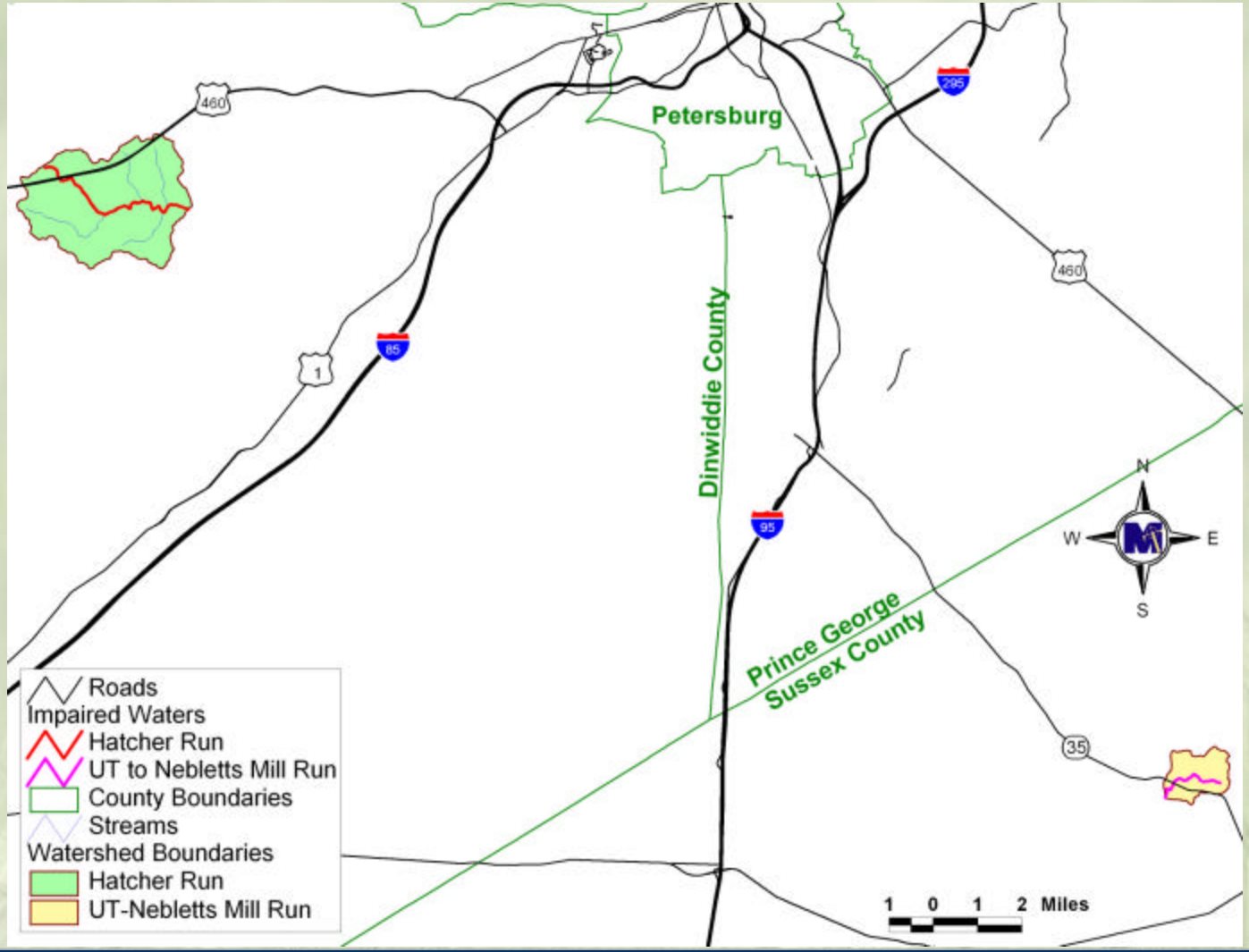




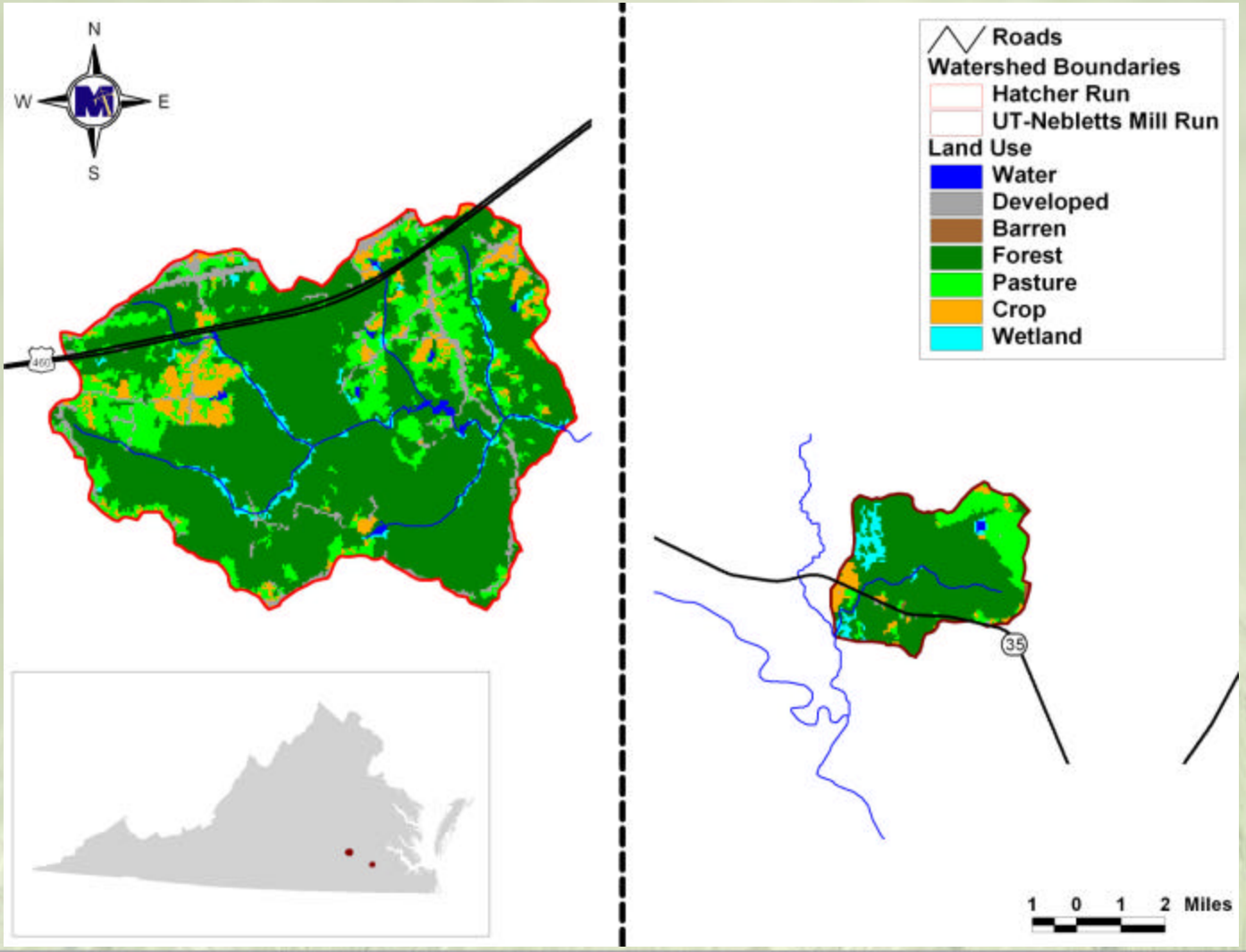
Study Area Locations



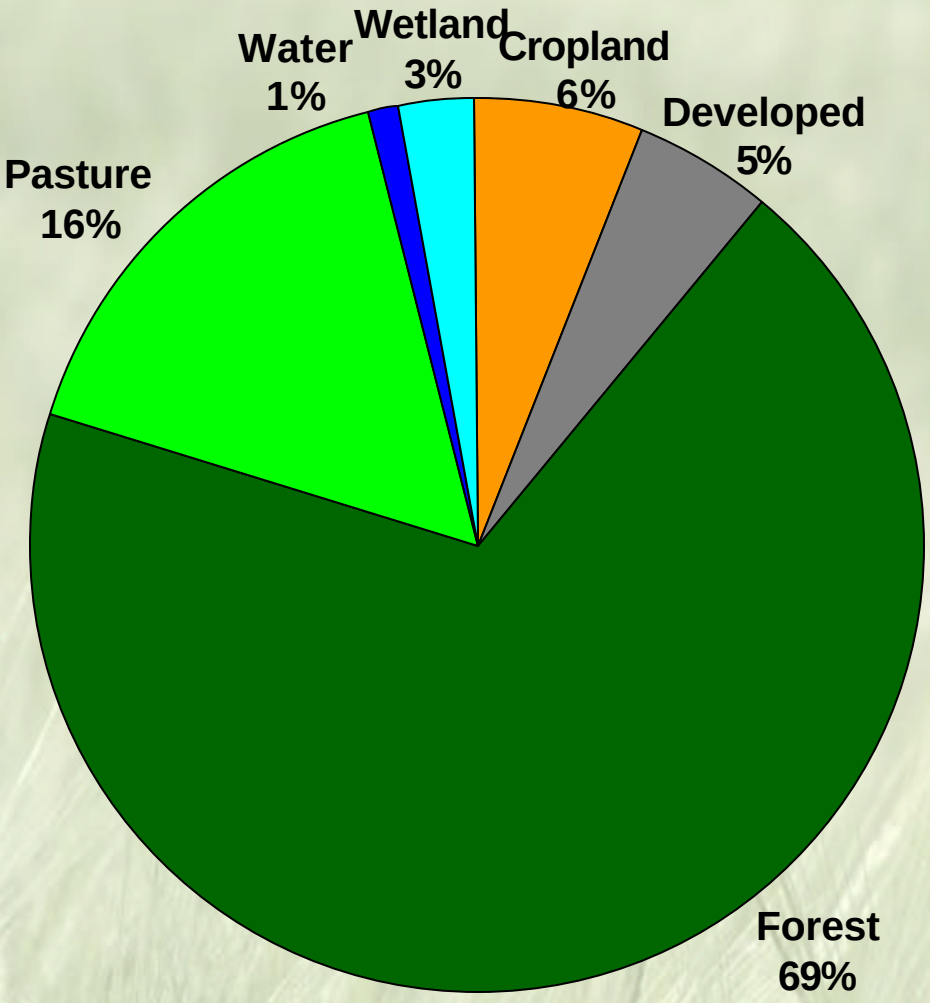
Impairments



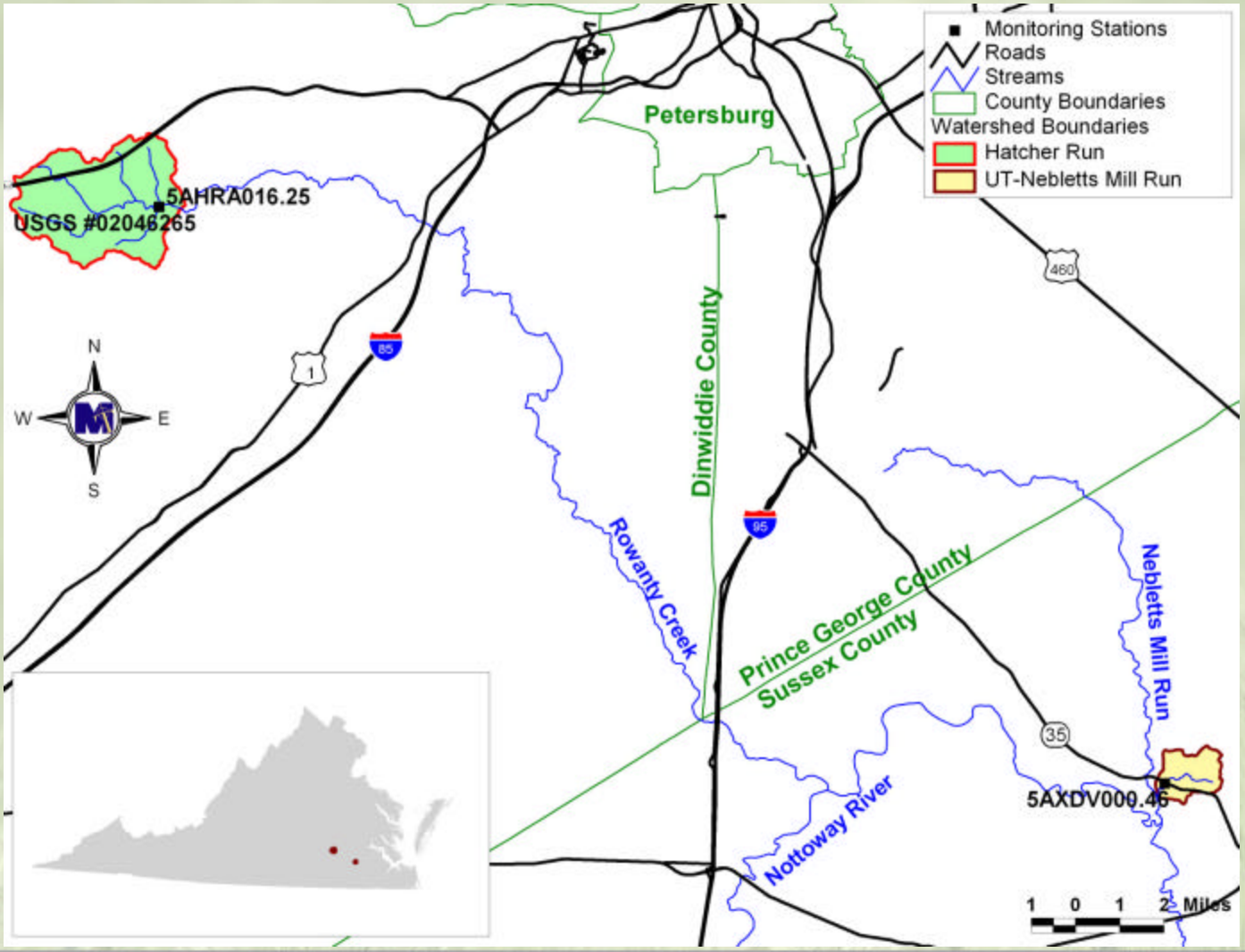
Watershed Land Uses



Watershed Land Uses



Bacterial Stream Monitoring Stations



DEQ and USGS Bacterial Data

E. coli data:

E. coli primary contact use single sample standard = 235 cfu/100mL

Stream	Station	Date	Count	Min	Max	Mean	Median	Standard Deviation	Violation %
Hatcher Run	5AHRA016.25	1/07 - 12/07	12	6	288	95	68	96	16.7%
UT Nebletts Mill Run	5AXDV000.46	6/04 - 12/07	11	100	800	399	380	278	63.6%

Fecal Coliform data:

Fecal Coliform primary contact use single sample standard = 400 cfu/100mL

Stream	Station	Date	Count	Min	Max	Mean	Median	Standard Deviation	Violation %
Hatcher Run	02046265	9/98 - 6/99	4	30	5,800	1,615	315	2,795	50.0%
UT Nebletts Mill Run	5AXDV000.46	12/97 - 3/05	26	18	9,200	1,530	170	2,895	46.2%

Bacterial Source Assessment

- Permitted discharges
  - Wastewater treatment facilities
  - Other Permitted Discharges
- Human
  - Biosolids
  - Failed Septic Systems
  - Straight Pipes
- Pets
- Livestock
- Wildlife

[Human + Pet + Livestock = Controllable Loading]

Permits in the Study Areas (2010)

0 VPDES Permitted Discharges

1 Confined Animal Feeding Operation (CAFO):

0 in Hatcher Run watershed

1 farm in UT Nebletts Mill Run watershed:

Housing ~11,790 hogs

Livestock Sources

Populations #s: Virginia Agricultural Statistics
Verified by local SWCD staff and citizens

Distribution of waste:
Pastured
Confined, waste collected, spread on cropland, pasture
Direct deposition to the stream

Seasonal varying applications

Livestock Population Estimates (2010)

MapTech's Initial Estimates:

Impairment	County	Beef Stocker	Beef Calf	Dairy	Horse	Sheep	Hog	Goat
Hatcher Run	Dinwiddie	55	55	0	1,900	0	0	0
UT Neblett Mill Run	Sussex	5	4	0	0	0	11790	0
Project Total		60	59	0	1,900	0	11790	0

Population verification from SWCDs:

Hatcher: Appomattox River SWCD = Numbers ok

UT Nebletts: Chowan Basin SWCD = There are 2 Murphy-Brown Hog Farms (3,500 hogs each) and 10 horses, 10 beef cattle, and 3 sheep

Human Sources

Population, housing units, and # of onsite treatment systems based on 1990 and 2000 U.S. Census

Failing Septic Systems:

- #s based on age of homes
- Effluent reaching ground surface throughout the year
- Lateral movement continuously to stream

Straight Pipes:

- #s based on “other” category in 1990 census
- Direct continuous input into stream

Biosolids:

- Land-applied treated waste from Municipal WWTFs
- Permitted by DEQ
- If applied correctly, shown to be a non-significant source of bacteria

Human Population Estimates (2010)

MapTech's Initial Estimates:

Impairment	County	Population	Housing Units	Houses with Sewer	Houses with Septic	Houses with Straight Pipes	Houses with Failing Septics
Hatcher Run	Dinwiddie	407	173	0	170	4	16
UT Nebletts Mill Run	Sussex	16	8	0	7	1	1
Project Total		423	181	0	177	5	17

VDH information:

Hatcher Run: 8 septic repairs completed in last 10 years; 2-3 repairs in the last 2 years.

UT Nebletts: No VDH response yet

Biosolids Applications

Impairment	# Farms	Wet tons	Dry tons	Time Frame
Hatcher Run	2	1,370	201	2003 and 2007
UT Nebletts Mill Run	0	0	0	NA
Project Total	2	1,370	201	2003 and 2007

Pet Sources

Population #s: based on literature values of animals per housing unit; updated with County license data

Housing unit #s: based on U.S. Census

Bacteria in model: Land-applied on Developed land use

Pet Population Estimates (2010)

MapTech's Initial Estimates:

Impairment	County	Dog	Cat
Hatcher Run	Dinwiddie	89	100
UT Nebletts Mill Run	Sussex	3	4
Project Total		92	104

Populations from County Dog Licenses area-weighted to these watersheds:

- Hatcher = 224 dogs
- UT Nebletts = 107 dogs

Wildlife Sources

Animal Densities: literature values from VDGIF biologists

Habitat: literature values from VDGIF biologists

Populations: Animal density (an/acre) * Habitat (acres) = total # of animals

- Species specific

Distribution of waste:

- Based on habitat
- Land-applied and
- Direct deposition to the stream

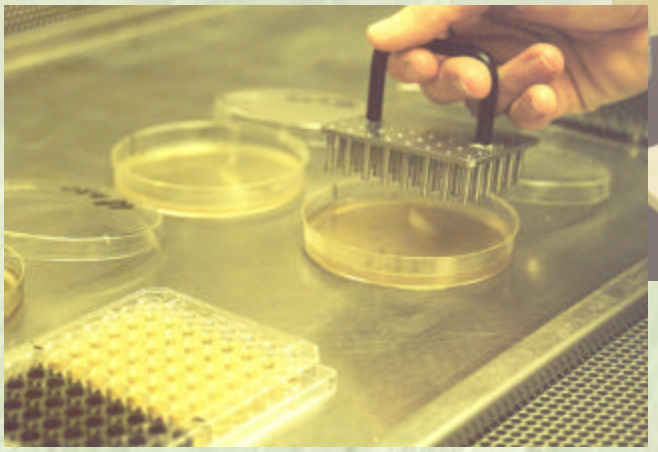
Wildlife Population Estimates

MapTech's Initial Estimates:

Impairment	County	Deer	Turkey	Beaver	Raccoon	Muskrat	Duck	Goose
Hatcher Run	Dinwiddie	174	43	51	357	2,651	6	3
UT Neblett Mill Run	Sussex	31	8	8	60	403	1	0
Project Total		205	51	59	417	3,054	7	3

Bacterial Source Tracking

- Antibiotic Resistance Analysis (ARA)
  Differentiates the sources of bacteria based on bacterial resistance to antibiotics

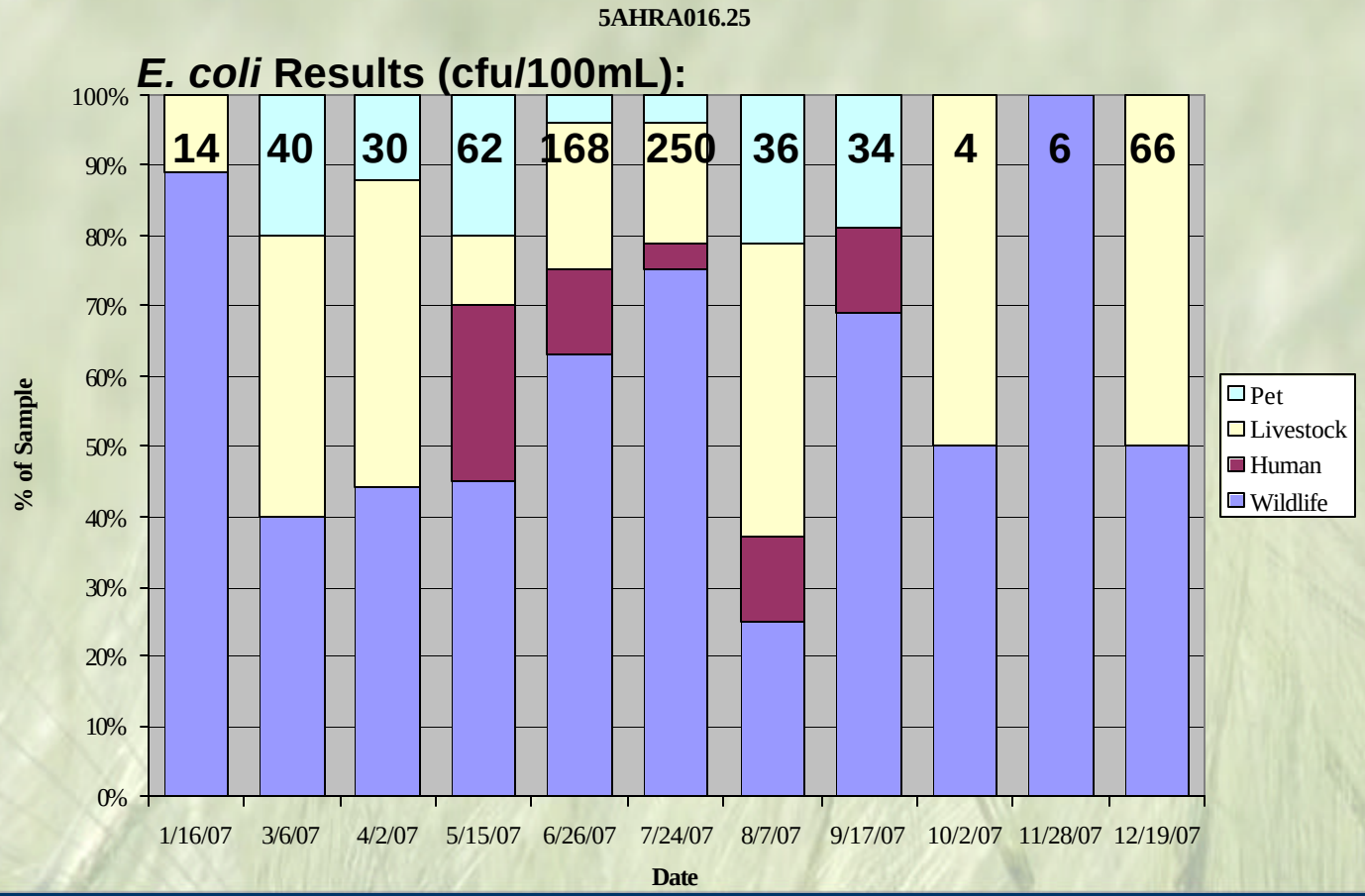


Bacterial Source Tracking Results

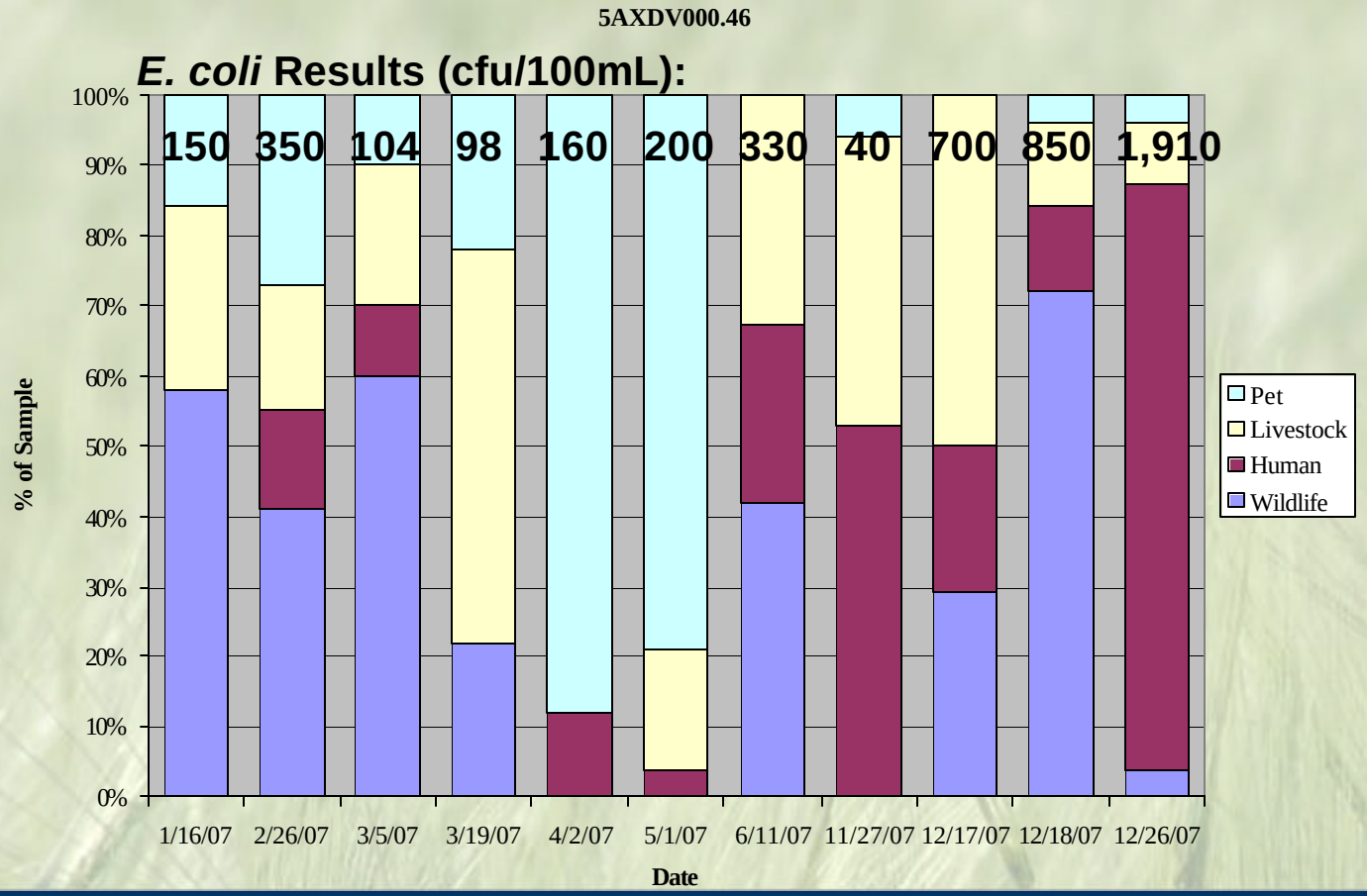
Impairment	County	Wildlife	Human	Livestock	Pet	Anthropogenic
Hatcher Run	Dinwiddie	62%	8%	23%	7%	38%
UT Neblett Mill Run	Sussex	27%	42%	20%	11%	73%

Anthropogenic = Human + Livestock + Pet = Controllable Loading

Bacterial Source Tracking Results: Hatcher Run



Bacterial Source Tracking Results: UT Nebletts Mill Run



Hydrologic Modeling Components

Climatic data
Land use
Topography
Soils
Stream channel characteristics
Point source discharge/withdrawal
Flow data

Water Quality Modeling Components

Source Populations
Fecal production per day
Bacteria densities per gram

Fecal distribution
Delivery Mechanisms:
- Direct:
- Land-applied

Temporal Variation

Modeling

How do we determine the TMDLs?

+

Watershed data

TMDL

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June 7, 2010

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Fecal Production Graph